

Chambers-Clover Creek Watershed – WRIA 12

The Chambers-Clover Creek Watershed is located entirely in Pierce County, Washington between Puget Sound on the west and the community of Graham on the east. The watershed covers 144 square miles and includes approximately 2,020 acres of lakes, extensive wetlands, as well as Chambers Creek and Clover Creek (PCPWU, 1994). The Chambers-Clover Creek drainage originates from spring and ground-water discharge to springs and seeps in the northeast corner of the watershed. The ground-water discharge forms the headwaters of Clover Creek, which cuts through the center of the watershed, flowing from east to northwest, ending just west of Interstate 5. Clover Creek enters Steilacoom Lake at river mile (RM) 5.8. Chambers Creek is then formed from the outlet of Steilacoom Lake flowing 4.0 miles north and west down a narrow ravine where it is joined by Flett and Leach Creeks before it discharges to Puget Sound through Chambers Bay. The watershed is also typified by a number of small lakes. American Lake (the largest lake in the WRIA) is hydrologically linked to ground water and has no natural outlet.

Land Cover and Land Use

The Chambers-Clover Creek Watershed is located entirely in Pierce County. The WRIA is predominantly urbanized, with land use consisting of residential, urban, and light industrial activities. Forty-two percent of the land in the watershed is classified as built-up (PCPWU, 1994). Large portions (approximately 68%) of the Tacoma West and Clover Creek/Steilacoom Lake subbasins are considered urbanized. The Tacoma West Subbasin is distinguished by higher industrial and higher density commercial land uses, while the Clover Creek/Steilacoom Lake Subbasin is dominated by suburban and medium-density development (PCPWU, 1994). The least urbanized portion of the Chambers-Clover Creek Watershed is the American Lake Subbasin, particularly within the northern portion of Fort Lewis and along the southwest portion of the subbasin (PCPWU, 1994).

The American Lake Subbasin includes Sequalitchew Lake and Sequalitchew Creek which flows west into Puget Sound. The development of the Town of DuPont and surface-water usage at the Fort Lewis Army Reservation has severely impaired the flow and character of Sequalitchew Creek, which has been documented in a report by Andrews and Swint (1994). The 38.4-square mile drainage basin of Sequalitchew Creek includes Kinsey Marsh which drains into American Lake through Murray Creek; seasonal overflow from American Lake flows into Sequalitchew Lake from which Sequalitchew Creek begins. A Fort Lewis diversion dam, canal, and a set of complicated culverts carry water from the creek into Puget Sound at Tatsolo Point. The remainder of the natural creek flows through Edmond Marsh, a 130-acre wetland bordering Fort Lewis and DuPont, then through a lush, steep canyon, supplemented by a spring and several seeps, into a salt marsh, and finally through a culvert under a railroad dike into the Sound.

Agricultural land includes active and open agriculture. Less than 300 acres (0.3 % of the watershed) are classified as agricultural. Natural cover accounts for 36 percent of the watershed and includes primarily grasses, shrubs, and brush, but schools, golf courses, cemeteries, landfills, and small farms also were included in this classification scheme (PCPWU, 1994). The Clover Creek Subbasin supports approximately 19,000 acres of natural habitat or 43 percent of the subbasin. The American Lake Subbasin is 38 percent natural cover, or approximately 6,500

acres, much of which lies within Fort Lewis (PCPWU, 1994). The population of Pierce County increased by 112.5 percent from 1950 to 1990. Between 1980 and 1990, the population of the county increased 20.7 percent. The majority of the population growth during the 1980s occurred in the unincorporated areas of the county.

The interconnection between ground and surface water is evidenced by the relatively high proportion of recharge contributed from stormwater infiltration to ground water (21 percent). Precipitation accounts for 66 percent of the recharge, and septic tank drainage and surface water bodies account for 11 and 2 percent, respectively (Brown and Caldwell, 1985). Thus, increasing urbanization can be expected to continue to adversely affect instream flows within this WRIA.

Water Rights and Claims

Water-use statistics for the Chambers-Clover Creek Watershed have not been consistently recorded over the years. WDFW biologists have observed illegal water diversions for irrigation or other purposes (Jim Fraser, Personal Comm.); however, it is also likely that numerous recorded or claimed rights are no longer in use. Until actual use is known, it must be assumed that all recorded water rights and claims are fully in use today and represent consumptive water use.

Surface-water use has increased steadily, with a total annual withdrawal of 131 cubic feet per second (cfs) and 2,478 per year acre-feet authorized from the surface waters of the watershed. As of September 1994, one application, requesting a total of 12 cfs for fish propagation was on file at Ecology. Ground-water withdrawals have shown a steady increase, and a total annual withdrawal of 453.2 cfs (203,401 gallons per minute [gpm]) and 144,705 acre-feet per year has been authorized from the watershed. As of September 1994, 17 applications for additional withdrawal, requesting a total of 50 cfs (22,395 gpm) for municipal supply, domestic supply, and irrigation were on file. After the 1980 closure of Chambers, Clover, and Sequelitchew Creeks and their tributaries from surface water withdrawal, the rise in water consumption has been dominated by the granting of ground-water rights.

A surface-water right issued in 1990 for 96 cfs is a non-consumptive use (for flood control) that diverts flow from Leach Creek into culverts in Nalley Valley. This diversion occurs to prevent flooding and is only triggered when Leach Creek flows exceed 60 cfs.

In addition, the Puyallup Tribe has fishing rights within the watershed that are considered to predate water rights and claims. In accordance with the Bolt Phase II decision, water quantity and water quality must be maintained to ensure adequate salmonid habitat. Implementation of this decision may require Ecology to consider the tribal fishing rights as the driving factor in water allocations, as well as issuance of wastewater-discharge permits and non-point-source pollutant controls.

As previously indicated, the original purpose of the Fort Lewis diversion is unclear, and detailed analysis of its effect on flow is difficult because of the lack of data on stream flows before construction of the diversion dam and canal. Controversy remains regarding authorization of the diversion, its effect on the salmon fishery, and current authority and responsibility for the dam's operation.

Fish Use

Anadromous salmonids found within the Chambers-Clover Creek watershed include hatchery and wild summer chinook (*Oncorhynchus tshawytscha*), hatchery and wild coho (*O. kisutch*), winter chum (*O. keta*), steelhead (*O. mykiss*), and cutthroat trout (*O. clarki*) (PCPWU, 1994). Chambers Creek formerly had a native summer run of chum salmon. Their escapement and number of fish returning to the creek to spawn ranged from 0 to 200 individuals between 1975 and 1980. They spawned from mid through late October in Chambers and Leach Creeks. The last three fish were seen in October of 1983. The stock has been declared extinct (WDFW, 1993; PCPWU, 1994).

Adult or juvenile salmon and/or steelhead trout are present within the basin throughout the entire year. Physical passage barriers, both anthropogenic and natural, pose a serious problem to anadromous fish movement and habitat conditions are generally very poor. A dam with a spillway and fish ladder forms the head of Chambers Bay approximately 0.75 miles upstream from the Burlington Northern Railroad dike at tidewater. In addition, a fish trap near the mouth of Chambers Creek and an impassible dam at the outlet of Steilacoom Lake, restrict the passage of anadromous fish. All salmonids that enter Chambers Creek are netted and placed on the upstream side of the fish trap. Because of existing passage barriers, the overall habitat available for anadromous salmonid production is limited to 9.0 stream miles in the lower watershed. However, salmonid spawning habitat in the lower watershed is rated as fair to excellent quality.

Anadromous fish production in the Chambers-Clover Creek Watershed is depressed as has been so for many decades.

Streamflow Status

Some of the conditions adversely affecting anadromous salmon and steelhead include seasonal flooding (altered hydrograph due to increased impervious surface area), low summer flows, unstable stream beds, physical barriers, poor water quality, high stream temperatures, the destruction of spawning habitat, and over harvest of wild stocks. Low streamflows experienced over a period of several years are known to be particularly problematic in this watershed.

No minimum instream-flow requirements have been established for this watershed. However, WAC 173-512 (1980) closed Chambers, Clover, and Sequim Creeks, and their tributaries (including lakes) to further water withdrawals.

Because the summer flows have not been measured since 1986 at three of the gages, no conclusions can be drawn about trends in low flows. For the Fircrest Gage on Leach Creek, the recent record indicates below average seven-day low flows. Increasing demands for surface and ground water can be expected to continue to affect low flows in this basin as development continues. Furthermore, increases in impervious surface areas due to expanding urbanization reduces ground-water recharge and, thereby would reduce base flows in the drainage basin. The effects of increased water demands through exempt wells and reduced ground-water recharge will have even greater consequences to flows, especially during extended drought conditions.

Summary and Conclusions

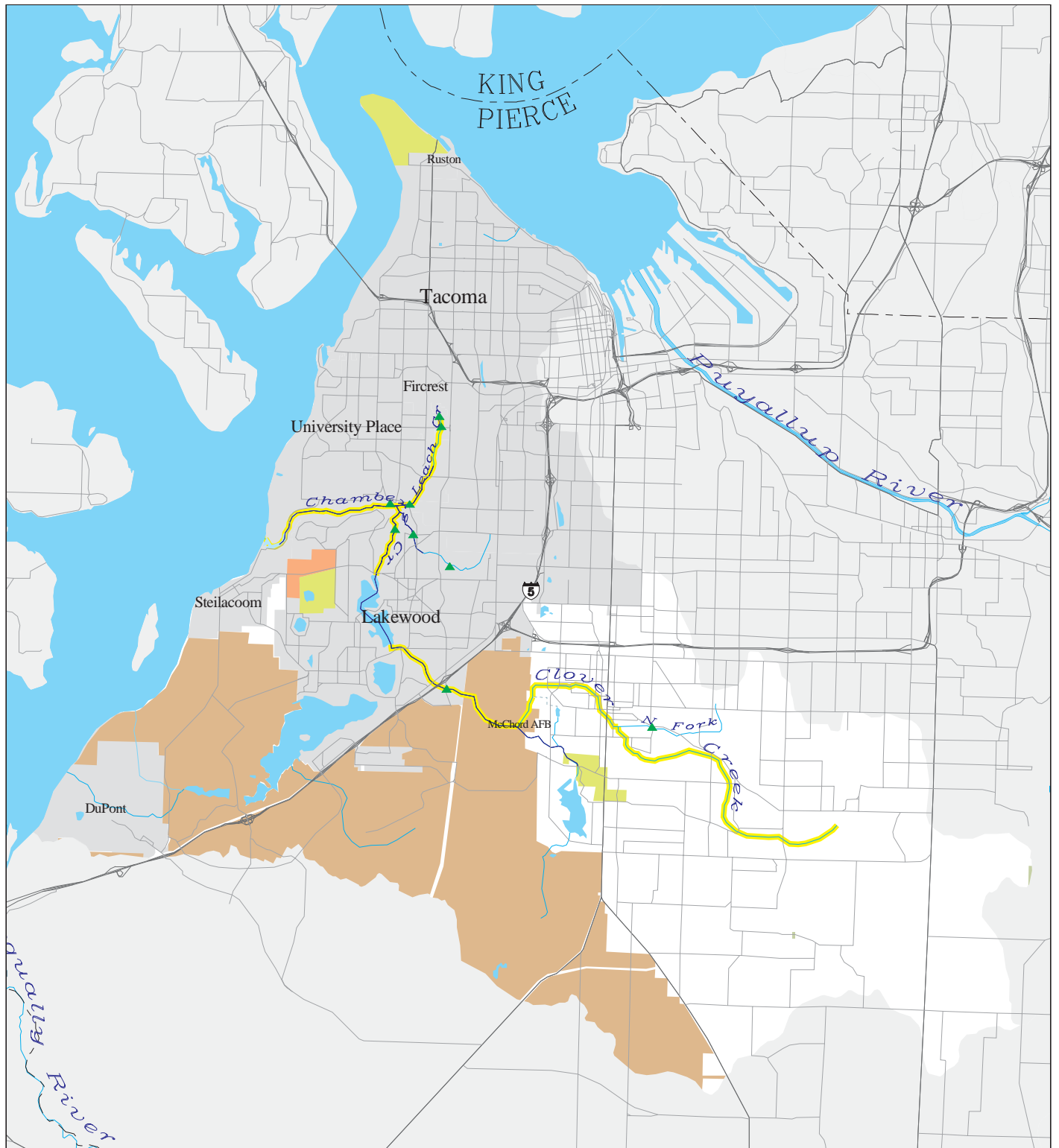
The National Groundwater Association classified the uppermost aquifer as either moderately or highly vulnerable to contamination because of the excessively well drained soils that are common throughout the area (EPA, 1993). The vulnerability has been substantiated by a number of instances of contamination. The interconnection between surface water and ground water is apparent in this watershed. Increased demand for ground water probably have affected low flows in the streams, although insufficient data is currently available to draw quantitative conclusions. Increases in impervious surface areas from expanding urbanization have reduced ground-water recharge and base flow.

To assist in re-establishing flows, a program to account for all water withdrawals (including the exempt withdrawals of less than 5,000 gallons per day) should be established. Unauthorized withdrawals also should be eliminated.

The measurement of actual water use or quantification of water rights has not been assessed by Department of Ecology for a number of reasons (Ecology, 1995). First, unauthorized-water users and claimed rights no longer exercised prevent correlation between the amount of water being used and the amount which are of water allocated by rights. No procedure is in place to track whether or not water rights issued in the past are still used. Second, most water-right claimants did not specify quantities on their claims; therefore, quantities for claims were estimated. A survey of actual use is critical to proper management of the resource. Third, unauthorized withdrawal has been documented but not eliminated. Such water use should be investigated and enforcement action taken, where appropriate.

Federal government facilities do not need water rights and are not required to report water use or consumption to the State of Washington. McChord Air Force Base and Fort Lewis operate their own water supplies independent of Washington's system of water management. This complicates the ability to assess water use and restoration opportunity in the basin.

Thus, it would not be prudent to acquire surface water for salmonid recovery in this basin until an inventory and measurement of actual water use is completed. Assurances are also needed to avoid instream flows from being affected by continued increases in exempt well use and increased impervious surface areas. It is unlikely that large industrial water users would be willing to sell water in this basin, especially when few alternative sources are available. Management of land use to maintain the status quo may be more feasible than water acquisition.



Stream Flow Prioritization: Chambers/Clover WRIA 12

Water Resources Program



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

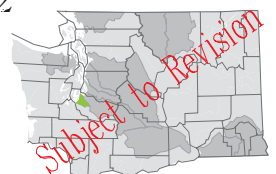
GIS Technical Services
12/13/02
sfp12-mpla

- US Forest Service
- US Wildlife Refuge
- US Parks/Recreation
- USFS Wilderness Area
- Bureau of Land Management
- US Dept. of Defense/Energy
- Wa. Dept. of Fish & Wildlife
- Wa. Dept. of Natural Resources
- State School/Hospital/Prison
- Wa. Parks & Recreation

- City/County Watershed/Park
- Tribal Lands
- Incorporated City
- USGS Stream Flow Gage
- Ecology Stream Flow Gage
- Water Right Purchase



- Low priority stream
- Medium priority stream
- High priority stream
- Salmon/Bull Trout Spawning/Rearing area
- Other streams
- Canal/ditch/pipe
- County
- Highway
- Local Paved Roads



WDNR/Ecology - Major Public Lands 2002 100k
WDFW/Ecology - Hydrography, 2000 100k
Ecology - WRIA, 2002 24K
WDOT - Transportation, 2001 24K
WDFW - Stream Flow Prioritization 2002
WDFW - Spawning/Rearing Areas 2002 100k
USGS/Ecology - Stream Gages 1:100k